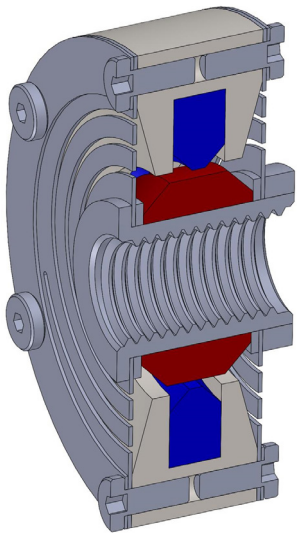


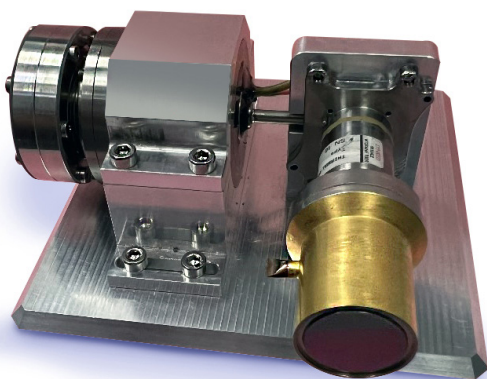
## Low-Vibration Cryocooler for Low SWaP Infrared Imaging

### ABSTRACT



The vibration resulting from an imbalanced motion of piston and displacer assemblies within Stirling linear cryocoolers poses significant challenges in the context of long-range, high-resolution, and low Size, Weight, and Power (SWaP) handheld and gyro-stabilized infrared imagers.

Addressing this challenge, CryoTech has introduced an innovative and cost-effective micro-miniature split Stirling cryocooler featuring a single-piston compressor and a pneumatic expander, where the vibration export has been effectively reduced at the source by substantially decreasing the weight of the moving assemblies. For vibration-sensitive applications, the authors provide an optional Tuned Dynamic Counterbalancer featuring a linear magnetic spring.



This patent-pending solution ensures a failure-free operation of a substantially lighter counterbalancer and a noteworthy reduction in the damping ratio, thereby enabling enhanced vibration attenuation at the driving frequency.

The authors provide a comprehensive overview of the outcomes from a thorough feasibility study, including theoretical investigations and full-scale experimentation. This holistic approach offers valuable insights into the success and potential applications of the groundbreaking technology introduced by CryoTech.